

Estuary planning and management in Portugal - sharing local boundaries for water resources management

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ABSTRACT

Estuaries concentrate complex and often conflicting sets of natural, economic and social resources and activities bringing multiple challenges to institutional frameworks, planning and management approaches as well as governance practices dedicated to their protection, maintenance and resilience. Portugal has recently adopted a new set of estuary plans of regulatory nature, which combine the perspective of water resources management with that of land-use management. This paper explores the conceptual specificities of estuary planning and management in Portugal and their potential role in contexts of multiple resources, users, instruments and institutions. Given the mentioned complexity and vulnerability to global change, these plans may be crucial for seeking better environmental governance and greater resilience. The paper is structured in three parts. The first one through a literature review summarises some of the main conclusions about the role and specificities of governance in estuaries. The second part presents the legal and procedural features of estuary plans in Portugal and their integration within the water resources and land-use planning systems. The third part concentrates on the specificities of the River Vouga Estuary (Ria de Aveiro), a Natura 2000 area that needs to deal with different, and potentially conflicting, socioeconomic sectors. Departing from a SWOT analysis of the main environmental, socioeconomic and institutional features, the paper argues for the relevance of an innovative planning and management instrument — capable of reducing the tensions inherent to local administrative boundaries and of contributing to a collective vision of the territory through the articulation of values, targets, instruments and means.

KEY WORDS: *governance, planning, estuaries, Ria de Aveiro.*

INTRODUCTION

Estuary areas assume an increasing strategic relevance in economic, social and environmental terms. The minimization of erosive processes, the maintenance of environmental services such as those associated to habitats and biodiversity, the maintenance or improving conditions for multiple and often conflicting uses and economic activities are examples of challenges that planning and management of these areas should endorse, especially if the pursue of sustainable development objectives is at stake (Townend, 2002).

Estuaries are a focal point for a wide range of human activities of increasing social and economic importance. The semi-enclosed basin that forms the estuary provides an area that is relatively sheltered, with a complex interplay of physical, chemical and biological processes, all of which are influenced by the marine environment and the surrounding catchment (Aubry and Elliott, 2006; McLusky and Elliott, 2004; Townend, 2002). In contrast with their ecological importance, estuaries are amongst the most modified and threatened aquatic environments (Blaber et al., 2000). Today, there are probably relatively few estuaries (mainly in the developed world) which have not been affected in some way by man's intervention (Townend, 2002). Anthropogenic effects are therefore a major agent influencing the morphology of an estuary either directly by means of engineering works and/or indirectly by modifying the

physical, biological and chemical processes at work within the estuary (Vasconcelos, 2007; Kennish, 2000).

Estuaries are also areas where valuable, highly sensitive and diverse natural systems coexist and which are extensively used for recreational activities, such as sailing, fishing and walking. Conservation and recreation have the potential to both contribute to, and conflict with, social and economic development and as such require careful balancing (Gibbs, et al, 2007; Townend, 2002). The complexity and dynamism of estuarine ecosystems creates conditions of extreme uncertainty and presents unique challenges for the design and management of governance systems. Moreover, estuaries are areas where several organizations overlap, with their own jurisdictions and management instruments and where there is a wide range of users with distinct interests. Hence, an integrated approach is needed to address multiple uses and interests, with sustainability being central to the management process (Carvalho and Fidélis, 2013).

Given the inherent complexity of these ecosystems, the issues involved in the planning and management of estuaries and estuarine banks need to be addressed in a holistic manner, considering an effective governance scheme, where multiple organizations located at different levels of government, stakeholders and civil society share a vision, objectives, strategies, resources, power and authority. This new challenge of governance requires changing institutional arrangements, modifying policies and altering the relationships between organizations and also the civil society to more comprehensive, integrated and

participatory approaches (Stojanovic & Barker, 2008; Antunes et al., 2009; Kallis et al., 2009).

This paper is prompted by recent changes to the spatial planning and water management and planning systems in Portugal, as a result of the publication of important pieces of legislation that have brought new challenges to these legal, institutional and regulatory frameworks. These changes present a considerable opportunity to the management of water resources, including estuaries, since this allow the chance to include measures of planning and development control in the estuaries, improving the decision making and governance process in water resources policy.

Through the enactment of the Water Law¹ and the revision of the Framework Law of Spatial Planning Policy² estuaries have received special attention throughout the creation of a planning instrument specifically dedicated to the planning and management of estuaries - the Estuary Land-Use and Management Plan ("*Planos de Ordenamento de Estuários*" - POE). These plans are meant to be applied to the estuary and estuarine margins and seek to protect their waters, beds and banks and the ecosystems associated, pursuing an integrated management perspective, including the improvement of the estuary as well as its associated environmental, economic, social and cultural assets

This paper explores the challenges that governance of estuaries has to face when multiple complex environmental values and problems, institutional frameworks and conflicting users are at stake. It also analysis the contribution that may be generated through the process elaboration and implementation of an estuary land use and management as foreseen in the Portuguese legislation.

GOVERNANCE OF ESTUARIES – FACING BOUNDARIES

In recent years there is an intense debate in scientific and political circles about governance content and challenges in the context of public policies, including water resources policy. New theories are emerging towards more tailored, comprehensive, integrated and participatory perspectives, where all are called to participate in the decision-making process within a framework of collaborative governance (e.g. Kallis et al., 2009; Antunes et al. 2009; Stojanovic and Barker, 2008).

In estuaries these aspects are crucial as they are boundary ecosystems between fluvial, marine and terrestrial environments, establishing relations of interdependence between the hydrological, physical, chemical, biological, geological and geomorphological cycles and between values and functions that occur upstream and downstream of this system. Furthermore, estuaries are also institutional boundary ecosystems gathering several municipalities, different administrative boundaries, multiple plans, multiple sector approaches (water, nature conservation, spatial development, fisheries, tourism, harbour) and uses and users that coexist in both water and estuary banks. The diversity, variability, complexity, richness and fragility of the estuarine environment, requires a fine balance and interaction between all these aspects. Thus, the problems and proposed solutions cannot be analysed by ecosystem, sector or administrative boundary, but equate within a

framework of interdependence, where the estuary is considered as a single territorial unit (Carvalho, 2010). The need for integrated approaches in the context of estuary governance has been reported by several authors, which evidence the following challenges:

- *Integration of aquatic ecosystems:* The management of estuaries should be integrated, reflecting the "continuum" of water resources and the principle of the territorial unit of the river basin mentioned in the WFD. Thus, in assembling transition systems it is justified that estuaries are addressed in an integrated framework among with river waters and coastal areas (Townend, 2002).
- *Ecosystem-based management:* The natural values and associated functions present in estuaries depend strongly on the balance between the aquatic and terrestrial habitats. It is therefore important to develop approaches that address the protection of ecosystems, land and water, i.e. that consider the estuary as a single territorial unit (Imperial, 1999)
- *Integration of natural and antropic systems:* The estuary includes natural factors, biophysical, socio-economic and political factors that are strongly interconnected, which means that a change in one part of the system can have consequences elsewhere in the estuary, being fundamental a holistic approach to estuaries (Townend, 2002).
- *Integration of scientific, technical empirical knowledge:* The complexity of natural and anthropogenic factors present in the estuary and the dynamism associated with the variability of estuary assets reinforces the need to incorporate scientific knowledge in estuarine management and planning. Furthermore, users often have a good knowledge of local specificities and the functioning of the ecosystem which is also essential to consider. Thus, approaches to estuaries must integrated scientific technical and empirical knowledge (Stojanovic and Ballinger, 2009).
- *Integration and coordination of sector policies:* The interdependence of water with agriculture, energy, industry, transport and communication, education, environment, health, town and regional development sectors determines the need for an integrated and transversal approach (Stojanovic et al. 2004).
- *Integration of all stakeholders in the decision-making process:* The people affected must have the opportunity to participate in and influence government decisions. The operationalization of integrative approaches is achieved through public participation and consensus building among stakeholders, which should include government, non-governmental organizations, interest groups, and others who have an interest in the issues addressed. The consensus produced by stakeholders creates a better and mutual understanding, which facilitates the implementation of political initiatives (Kallis, et al., 2009; Stojanovic & Barker, 2008; Stojanovic et al., 2004). Therefore an effective approach to decision making in estuaries requires an interactive process and adaptive learning, which combines scientists, technicians, politicians and users in a shared governance structure (Townend, 2002).

¹ Law No. 58/2005 of 29th December

² Law No. 44/1998 of 11th August

The governance approach to the estuary should also integrate the scientific knowledge of ecological relationships and context of socio-political values, with the overall objective of protecting the integrity of ecosystems to ensure its long term sustainability (Stojanovic et al., 2009). While holistic approach that integrates natural systems, users, local communities and government institutions, the ecosystem-based management requires a governance model that addresses the various institutional challenges facing. One of these challenges, is to endorse a collaborative action, which requires changes in behavior on the part of institutions and actors. In other words, requires that the various parties have the ability to build collaborative, credible and sustained platforms (Boesch, 2006).

GOVERNANCE OF ESTUARIES IN PORTUGUESE

Traditionally, the management of estuaries in Portugal has been characterized by sector approaches (nature conservation, tourism, agriculture, fisheries, urban management, for instance) which have determined detached management strategies, with no clear concern for defining an integrated strategy. Indeed, the approach to estuary management made by the existing law and land use management instruments did not consider the estuary as a unique territorial environmental unit and has on the whole been shown to be insufficient to cope with this complex reality. This was due to inadequate scale, or because their scope was limited to the margins, or because the various approaches to management and planning do not cover all dimensions of the estuary, or due to the lack of coordination between the various management instruments (Carvalho and Fidélis, in press).

The recent creation of Estuary Land Use and Management Plans by the Decree-Law n.º 129/2008, 21st July aims to fill this gap. These plans are specifically dedicated to the estuary and estuarine banks and embody a new planning concept as they were created in the confluence of the water resource planning system and land use planning system, resulting in a an instrument that is simultaneously a tool for both water resource management and land use planning systems and aim to integrate their objectives (Carvalho and Fidélis, in press).

Their main objectives include:

- to protect and enhance the environmental characteristics of the estuary, ensuring the sustainable use of resources water as well as natural values associated;
- to ensure integrated management of transition with the adjoining inland and coastal waters, as well as the respective banks;
- to ensure the sustainable functioning of estuarine ecosystems;
- to preserve and restore riparian and aquatic species, protected or endangered and their habitats;
- to ensuring coordination with territorial management tools, plans and programs of local and regional and national law applicable in the area of the POE.

As specific objectives the law establishes the following:

- to set rules for use of the estuary, promoting the quality of natural resources, including conservation and rehabilitation of the coastal zone and estuaries;
- to establish rules and measures to use the estuarine waterfront, with consideration of spatial management tools

- to enable sustainable management of associated ecosystems;
- to identify key areas for nature conservation and biodiversity in the estuary and its edge and where appropriate, to establish different levels of protection;
- to establish the preferred, conditional or prohibited uses in the area covered by the plan, safeguarding local urban, recreational, tourist, scenic, environmental, cultural and particular interest.

Adequate integration of sector approaches requires a unified and integrated approach to estuaries, and a close liaison and coordination between:

- government bodies with jurisdiction to intervene in the estuary and estuarine banks;
- planning and land management measures to be applied to the area covered by the POEs;
- the various uses and users present on the estuary, banks and water surface.

It is in this context that POE specific law³ state that these plans shall provide an opportunity:

- to endorse integrated approaches, ensuring the coordination amongst territorial management tools, plans and programs of local, regional and national interest;
- to adopt approaches that promote the conciliation of interests and consensus building among estuary users
- to harmonize the economic activities (port, industrial, transport and tourist fishing) with the protective functions of the natural values and leisure and recreation activities.

The elaboration of POEs is the responsibility of the Portuguese Environmental Agency (*Agência Portuguesa do Ambiente*) being this duty shared with the Nature Conservation and Forest Institute (*Instituto Conservação da Natureza e Florestas*) when the jurisdiction of an POE fully or partially overlaps with a protected area under the National Network of Protected Areas including the Natura 2000 network. Its implementation is fundamentally the responsibility of the Portuguese Environmental Agency, however, as POE are mandatory for both private and public entities, a large number of agencies and individuals including issues such as management, permitting, inspection or plan monitoring will be involved.

Considering articulation and integration purposes the POE specific legislation foresees that the process of plan elaboration is supervised by a Follow-up Committee specifically created for each plan, whose membership reflects the nature of the interests to be safeguarded and to the importance of the technical implications under consideration, and includes agencies which, by virtue of their specific environmental responsibilities, may have an interest in the environmental effects of implementing the plan. It also refers that the involvement of the municipalities integrated in the estuary in the elaboration process has to be guaranteed. Moreover, the water resources legislation also provide the representation of business sectors and users of water resources in the Council of Hydrographic Region (*Conselhos de Região Hidrográfica*), a water resources advisory body at regional level.

The elaboration of the POE is also subject to public participation and public discussion, although the experience gathered from the elaboration processes of other special

³ Decree-Law No. 129/2008 of 21st July and Ministerial Order n.º 22550/2009 13th October

land-use plans have shown that the participatory process is basically limited to information, consultation and public discussion of the plans in their final phase giving poor space for true collective exercise of visioning and planning and weak involvement of stakeholders (Carvalho and Fidélis, in press).

The harmonization with other plans is to be assured by the Regional Development and Coordination Committee (*Comissão de Coordenação e Desenvolvimento Regional*), having into account the content of legal framework of spatial planning policy. The existing legal framework foresees the need for coordination between the various plans, institutional collaboration and public participation in the preparation of the POE, which are crucial aspects to achieve integrated approaches. The very demanding exercise to (re)conciling interests and shared responsibility, however, depends on a strong commitment by the institution responsible for implementing the plan and of a strong governance model to ensure the involvement of all actors, institutional and non-institutional, not only in the plan preparation, but also in its implementation.

CHALLENGES IN THE ESTUARY OF RIVER VOUGA (RIA DE AVEIRO)

The territory associated to Ria de Aveiro is a challenging laboratory for estuary governance matters. Firstly, it includes a hierarchy of multiple areas of environmental protection statutes including nature reserve, national ecological reserve and Natura 2000 network. Secondly, it is involved by a myriad of human, often conflicting, activities ranging from urban, industrial, fisheries, aquaculture, agriculture, tourism, navigation and harbour activities, among others. These have associated various social and economic dimensions as well as cultural and historical roots. Thirdly, Ria de Aveiro is covered by a complex framework of public agencies with different types and levels of responsibilities for its management and protection. Fourthly as result of European and national legal frameworks, it is also covered by a set of policies, plans and programs aimed to guide investments, to establish strategies and quality standards as well as to control uses within the water bodies and on the estuarine banks, which arise from various government sectors. Water resources, flood and coastal management, nature conservation and spatial planning are relevant examples of those sectors.

Many of the natural and landscape values of Ria de Aveiro are a result of economic uses of natural resources and conditions, some of which have persisted throughout history, like the salt production, and which have structured many of its current features. Ria, however, is also characterized by a strong hydrodynamic and very vulnerable to tides, storm surges and upper river extreme events, often requiring human intervention for requalification, protection and facilitation of conditions to endure economic activities. This context explains the fragile (un)balance between environment values, human intervention and development. It also sustains the remaining ambivalence of stakeholders discourses, which easily float between development, efficient resource use and nature conservation and make the management of Ria de Aveiro a complex knot to unravel.

Having in mind the main estuary government issues highlighted in the first section, and the specificities of Ria de

Aveiro, figure 1 summarizes major results of a SWOT analysis regarding management problems and challenges.

Strengths Rich water resources and biodiversity Rich in landscape and cultural heritage Multiple economic activities using the natural resources, being used as a socio-economic complement of families Dynamic inter-municipal work Capacity to attract investment Laboratory of research	Weaknesses Degradation of environmental values and services Misuse of economic values Complex institutional framework Multiple stakeholders and users Lack of organization and association among users Poor communication and integration of knowledge into action
Threats Vulnerability to flooding risks and climate change Complexity of natural functioning systems Salinization of agricultural land in margins Abandonment of traditional water based activities inadequate use of resources Complexity of institutional framework, plans and policies Complexity of types and height of uses and users Centralization of water resources agency	Opportunities Wide range of data and knowledge from research projects New emerging techniques, uses and practices Increasing recognition of the need for integrated and participatory approaches Requirements of WFD and Flood directive and the role stakeholder and users vulnerable to flood should take Horizon 2020 and related water resources governance challenges

Some of the items outlined in the swot analysis are able to highlight examples of border-like issues which have to be further deployed in an integrated context if the estuary and its values and vulnerabilities are to be adequately taken care: i) the technical issues as those related to hydrodynamic and ecosystems services; ii) the economic issues as those related to the economic activities their efficiency and sustainability levels having in mind the carrying capacity of the estuary; iii) the social issues as those related to the social impact of economic activities, the cultural and historical values and narratives associated to stakeholders; iv) the environmental and legal issues has those related to the requirements and challenges emerging from the implementation processes of the Water Framework Directive, the Flood Directive or the Natura 2000 Directives; or v) the administrative issues resulting from the existence of different responsibilities, procedures, plans and policies often overlapping or poorly integrated, not to mention many other issues. Although seemingly competing, all these issues must be considered within a sustainability context and resilience of the estuary.

The elaboration of the POE for Ria de Aveiro, undertaken under a strong collaborative process, will provide a privileged forum for discussion of options for planning and management around the estuary (while single territorial unit) and between the various stakeholders which use it, in the perspective of an effective integrated and sustainable approach for water resources and associated uses. It is expected that the development of this instrument of territorial management will endorse a strategy of consensus building between the different interests - port, industrial, transport and tourist fishing – aiming the compatibility of economic activities with the protective functions of natural values and recreational activities and leisure.

The challenge of preparing this plan results from its novelty, as it is the first plan devoted to the issue of enhancement and protection of estuarine water resources and associated ecosystems and also because constitutes a privileged place to discuss options for planning and management among the

various stakeholders seeking an effective integrated and sustainable water resources management.

The POE plan can be seen as an instrument of a second generation of planning practice as it aims to build a collective vision among institutional and non institutional actors and to establish a model of shared governance for Ria de Aveiro, encouraging shared and joint responsibility, as well as the coordination and sector policies. However this requires a truly process of stakeholder's involvement in plan elaboration and in the implementation of the proposed measures, looking for a shared responsibility in the planning and management of the estuary.

CONCLUSIONS

The existing law and land use planning instrument have not been able to respond to the requirements and complexities of estuarine management, due to inadequate scale and scope or due to the absence of sector policy integration in the decision-making instruments.

Estuary land use management plans are an opportunity to approach estuaries as a unique environmental and territorial unit, opening horizons to the development of a dynamic and participated process through which a strategy is developed to mobilize human, cultural and financial resources to safeguard conservation and sustainability of environmental values and functions for the Portuguese estuaries.

These plans also challenge current planning and management practices as they provide an opportunity to implement best practices in planning practice. It is a challenge that requires cross-sector policy harmonization and the articulation of agencies, integrated management of water resources and terrestrial ecosystems and consensus building among different uses and users, providing the opportunity for conflict resolution and the establishment of partnerships for a shared governance of the estuary.

Ultimately we expect that estuary land use management plans become a new generation of planning capable of integrating new performances in the praxis of land use planning and water resources planning and management where values and functions associated to nature and water resources should be seen as challenging opportunities to project new futures of collaboration.

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